PATENT SPECIFICATION 941,580

DRAWINGS ATTACHED.

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941,580

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COMPLETE SPECIFICATION.

Improvements in or relating to Electrical Heating Units.

We, APSLEY METAL PRODUCTS LIMITED, of 115-129 Carlton Vale, London, N.W.6, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to an electrical heating unit of the type wherein heat generated by an electric current passing through a heating element is removed by means of an air flow created by a cross-flow blower, which is an air blower comprising a drum-like rotor having blades disposed about its circumference, and inclined relatively to the radial direction of the rotor, the rotor being partially enveloped by a casing having an inlet opening and an outlet opening, the arrangement being such that in use the rotor draws into the casing through the inlet opening and ejects the air through the outlet opening, the said openings being separated from each other by a wall portion of the casing (hereinafter called "heating unit of the type described").

By a suitable choice of heating element, the element may normally be prevented from overheating.

A cross-flow blower creates such an intensive air flow that the heating element may be compact, and the heat created in a space which is small as compared with heating units utilizing convection of air or employing different kinds of blowers.

Owing to the heat created in a small space, the heating element is liable to damage by overheating whenever the air flow is interrupted or interfered with, for example, owing to a failure of the cross-flow blower.

The invention consists in a heating unit of the type described, comprising a heat responsive cut-out switch for the heating element, a heat responsive element of the cut-out switch being arranged in the proximity of the heating element and in the air flow thereover. For example, the heating element may comprise a plurality of resistor coils, the heat responsive element of the switch overlying part of at least one of the resistor coils.

The heat responsive element may be on top of the resistor coil or coils when the heater unit is in its normal position of use.

It will be appreciated that, although the heating element exerts a heating action on the heat responsive element, the air flowing thereover in normal use of the heating unit has an opposed cooling action on the heat responsive element and the cut-out switch will not respond, even when set for a temperature only a few degrees above the air flow temperature. If, however, the air flow is interrupted or interfered with, the cooling action is no longer exerted on the heat responsive element, and if the cut-out switch has been set for responding at temperature only a few degrees above the air flow temperature, then the heating action of the heating element will cause the heat responsive element to rapidly reach the response temperature and effect operation of the cut-out switch.

Advantageously, the heat responsive cut-out switch is provided with means enabling adjustment of its response temperature.

In order to make the invention clearly understood, reference will now be made to the accompanying drawings which are given by way of example and in which:—

Fig. 1 is an elevational view of a heating unit; and

Fig. 2 is a sectional view along the line II—II of Fig. 1.

The heating unit comprises an outlet passage for heated air, the passage being formed by four pressed metal plates 1, 2, 3 and 4 spotwelded at their corners to form a rectangular frame 5. Four spacers 6 of insulating and heat-resisting material are fixed at intervals across the frame 5 to increase the rigidity thereof and to act as guides for resistor coils 7. A bolt 8 is provided which extends across the frame 5 and connects the half-way points of the two longer plates 3 and 4 of the frame 5.

Eight resistor coils 7 extend inside the frame 5 in the longitudinal direction thereof and are arranged in two columns each of four coils, the coils of one column being laterally offset relatively to the coils of the other column by the width of a single coil. The four coils of each column are connected in series and insulated wires 11 provide independent leads from the two columns for connection to a power supply. Switches may be provided for controlling the supply of current to the two columns independently.

A heat responsive cut-out switch 12 is fixed to the frame plate 3 which lies uppermost when the heater is in its normal working position. The cut-out switch 12 has a heat responsive bi-metal strip 13 arranged in the air flow leading to the resistor coils 7, the end of the bi-metal strip 13 lying close to the top resistor coils 7 of each column. Due to the proximity of the bi-metal strip 13 to the resistor coils 7, the strip 13 can respond quickly to overheating of the resistor coils 7, while, due to the arrangement of the bi-metal strip 13 in the air flow leading to the resistor coils 7, a cooling action is exerted on the bi-metal strip 13 in normal use of the heating unit which is sufficient to maintain the bi-metal strip 13 at a temperature only a few degrees above that of the air flow. The response temperature of the cut-out switch 12 can thus be set fairly close to the normal temperature of the air flow, this response temperature being quickly reached on interruption of the air flow.

For example, when the heating unit is intended to heat air in a space to a temperature of 60° C., the resistor coils may be so arranged that air leaves the heating unit at a temperature of 110° C., the air flowing into the heating unit for reheating having a temperature of up to 60° C. In such a case the heat responsive cut-out switch 12 may be set for responding at a temperature of 65° C., so that in normal use of the heating unit the bi-metal strip 13 has a temperature lying between 60° and 65° C. and the switch 12 does not respond. On interruption of the air flow, the resistor coils 7 rapidly heat the bi-metal strip 13 to 65° C., causing response of the switch 12.

In a modification of the heating unit, the cut-out switch is adjustable, whereby its response temperature may be set to a point a few degrees above the desired ambient air temperature.

The bi-metal strip 13 has a contact element 14 which normally engages a contact element 15 of a fixed contact strip 16 forming part of the switch 12 but disengages from the contact element 15 when overheating occurs. The heat responsive switch 12 should be connected in series with the resistor coils 7 so as to interrupt the heating action when overheating occurs.

WHAT WE CLAIM IS:—

1. A heating unit of the type described, comprising a heat responsive cut-out switch for the heating element, a heat responsive element of the cut-out switch being arranged in the proximity of the heating element and in the air flow thereover.

2. A heating unit as claimed in Claim 1, wherein the heating element comprises a plurality of resistor coils, the heat responsive element of the switch overlying part of at least one of the resistor coils.

3. A heating unit as claimed in Claim 2, wherein the heat responsive element is on top of the resistor coil or coils when the heater unit is in its normal position of use.

4. A heating unit as claimed in Claim 1, 2 or 3, wherein the heat responsive cut-out switch is provided with means enabling adjustment of its response temperature.

5. An electrical heating unit, constructed, arranged and adapted to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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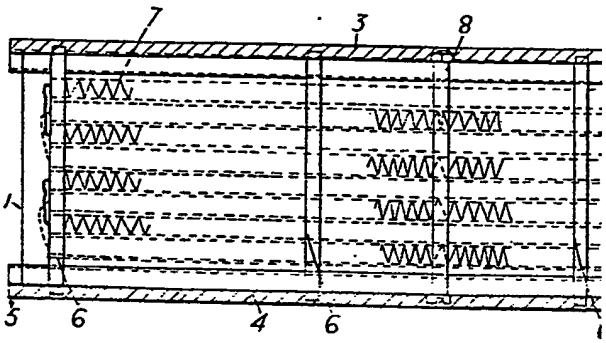

Fig.2

941580 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

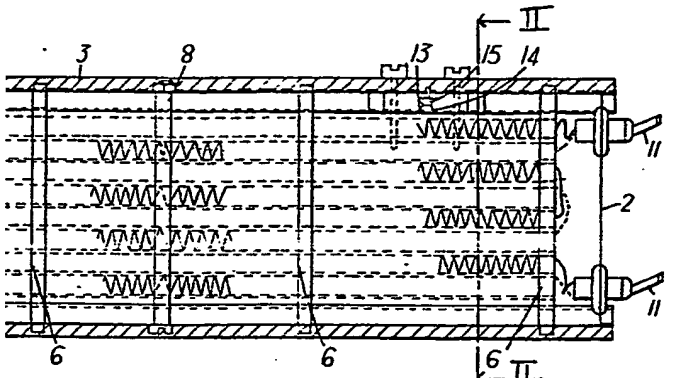

Fig.1.

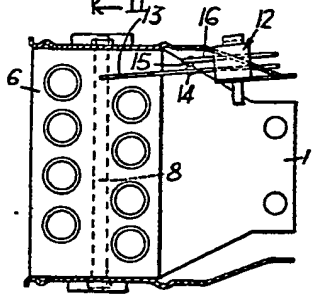

Fig.2.